Reducing VOC Emissions from Field Fumigants

January 2008 *(revised)*

New regulations changed how fumigants can be used in certain areas of California.

Regulations that went into effect in January 2008 changed how field fumigations can be done in many regions of the state. The changes are required to reduce emissions of volatile organic compounds (VOCs) from pesticide applications. VOCs contribute to the formation of smog. The regulations focus on both limiting the total pounds of pesticide emissions and reducing the amount of fumigant emitted from each application. The rules:

- Limit fumigant emissions from May to October in certain geographic areas.
- Change pesticide use reporting to include specific methods used for field fumigant applications in five geographic areas.
- Define specific requirements on how field fumigations must be done, prohibiting some high-emission methods and limiting applications to low-emission methods in some areas.
- Set up new licensing requirements for companies that do field fumigations. This is the only statewide requirement in the new regulations. *(This element of the rules does not take effect until 2009.)*

The new rules focus on:

- Limiting the total pounds of pesticide emissions.
- Reducing the amount of fumigant emitted from each application.

Which fumigants do the rules apply to?

The regulations apply to the field fumigation use of the seven farm fumigants that release VOCs:

- Methyl bromide
- 1,3-Dichloropropene (brand names, Telone, Inline)
- Chloropicrin
- Metam-sodium (Vapam, Sectagon), which produces methyl isothiocyanate (MITC), a VOC
- Potassium N-methyldithiocarbamate, also called metam-potassium (K-Pam), which produces MITC
- Dazomet, also called tetrahydro-3,5-dimethyl-2H-1,3,5-thiadiazine -2-thione (Basamid), which produces MITC
- Sodium tetrathiocarbonate (Enzone), which produces carbon disulfide gas

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Background Information

What are volatile organic compounds (VOCs)?

VOCs are carbon compounds that evaporate easily into the atmosphere. The primary source is vehicle exhaust. VOCs are also emitted by industrial operations and thousands of products, including paint, cleaning supplies, building materials, office equipment (such as printers), permanent markers, glues, pesticides, and many cleaning, disinfecting, cosmetic, degreasing, and hobby products. Fuels are made up of VOC-emitting organic chemicals. All these products can release VOCs while they are being used and, to some degree, when they are stored.

Smog is formed when VOCs react with other substances in the air in the presence of sunlight.

What are fumigants?

Fumigants are gaseous pesticides used to treat structures, storage bins, commodities, and soil before planting. The regulations apply only to products used for field fumigation, that is, they are applied to or injected into soil.

About one-fourth of the pounds of pesticides used in agriculture are fumigant compounds. Because they are usually applied at a rate of several hundred pounds an acre, and are very volatile, fumigants account for an even higher proportion of VOCs emitted by pesticides. Statewide, more than half of pesticide VOCs come from fumigant applications. In some areas of the state, up to three-quarters or more of the pesticide VOCs are from fumigants.

Do the regulations apply to all fumigant uses?

No, they are limited to field soil treatments because more than 90 percent of fumigant emissions come from field fumigations.

The new rules do not apply to fumigant use in greenhouses, certain nursery fumigations, potting soil, individual tree and vine replant sites, harvested commodities, or structures.

What prompted the regulations?

Under the federal Clean Air Act, each state must have an approved plan (called a "State Implementation Plan," or SIP) to meet federal air quality standards, including the standard for ozone. Ground-level ozone (smog) is the nation's most pervasive air pollutant. It can damage lung tissue, cause respiratory illness, and harm farm crops.

Statewide, pesticides and fertilizers account for about two percent of VOCs, but in several regions, they are among the top ten sources. DPR is responsible for tracking and controlling VOC emissions from pesticide products used in agriculture and by commercial structural applicators, while the California Air Resources Board (ARB) is responsible for VOC emissions from fertilizers and pesticides in consumer products.

DPR has been working for several years to reduce VOC emissions from pesticides. In 2006, a federal court judge ordered DPR to put regulations

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in place by January 2008 that will reduce pesticide VOCs.

Why aren't you reducing VOC emissions from other sources?

We are. For many years, the ARB has been a world leader in advancing the cause of cleaner air. The ARB has put rules in place to reduce vehicle exhaust, industrial emissions, and VOCs emitted by a wide range of consumer products, including household pesticide products.

What about reducing VOCs from non-fumigant pesticides?

DPR is requiring manufacturers of non-fumigant pesticides to reformulate products so they emit less VOCs, mainly by changing solvents in them. This will take several years to do.

Reformulation isn't possible with fumigants. In fumigants, the active ingredient (not a solvent) is itself the volatile organic compound. The focus has to be on requiring low-emission application methods, or on reducing the frequency of applications or the amount applied.

Modifying field fumigation practices was the only practical way to meet the reduction goals to meet the court-ordered deadline of January 2008, for two reasons. Fumigant emissions account for a high portion of pesticide VOC emissions. In addition, changes in fumigant use practices can start as soon as regulations go into effect.

Who decides how much VOC reduction is needed?

California made a commitment to the federal government to reduce pesticide VOCs by 20 percent, compared with a base year, in parts of the state that violate federal air standards. (The federal court ordered DPR to use 1991 as the base year.)

Controls DPR put in effect over the past several years have not reduced pesticide VOCs enough in three of the state's ozone nonattainment areas.

Areas Affected by the Rules

What is an ozone nonattainment area (NAA)?

The federal Clean Air Act requires California to track and reduce VOCs by certain amounts in parts of the state with the dirtiest air.

In 1994, the Air Resources Board and DPR committed to track and reduce pesticidal sources of VOCs in five regions that did not meet the federal ozone standard. These ozone nonattainment areas (NAAs) were Sacramento Metro, San Joaquin Valley, Southeast Desert, South Coast, and Ventura.

Because of the controls DPR already put in place, the Sacramento Metro and South Coast NAAs now meet their VOC reduction goals for pesticides. The San Joaquin Valley, Southeast Desert, and Ventura NAAs do not.

What counties are in the three NAAs that need further pesticide VOCs reductions?

The San Joaquin Valley NAA includes all of San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, and Tulare counties and the valley portion of Kern County. The Southeast Desert NAA includes the desert portions of

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For a map of the areas affected by the new rules, go to www.cdpr.ca.gov, click on "A-Z Index," then "Nonattainment area maps."

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Riverside (Coachella Valley), Los Angeles (Lancaster/Palmdale), and San Bernardino (Barstow) counties. The Ventura NAA encompasses all of Ventura County.

For NAA maps and geographic sections in them, go to www.cdpr.ca.gov, click on "A-Z Index," then "Nonattainment area maps."

How will the new regulations reduce pesticide VOCs?

In areas where pesticide VOCs need to be reduced, DPR will develop fumigant emission limits, require only low-emission application methods be used, and may restrict fumigant emissions by individual growers.

Why not reduce VOCs by only requiring that low-emission methods be used?

In many areas of the state, further VOC reductions are not needed. In areas that do not meet their pesticide VOC reduction goals, low-emission methods will be required.

However, requiring low-emission methods may not be sufficient to keep emissions below the limit in an NAA. For example, if fumigated acres increase, even if all applicators used low-emission methods, the VOC reductions may not be enough to achieve the required goal.

Fumigation Methods Allowed

What are the low-emission application methods?

Different methods of applying fumigants emit different amounts of VOCs. DPR has estimated the percentage of VOCs emitted for each fumigant, for most application methods. Lower-emission methods are typically those that are:

- Covered with tarpaulins,
- Covered with several post-fumigation water treatments, or
- Applied through drip irrigation.

Other ways of limiting emissions are also specified in the regulations, depending on which fumigant is used. They include reduced application rates, soil moisture requirements, injection depth specifications, soil compaction requirements, and a mandate for a tarpaulin repair response plan.

What fumigant application methods will be allowed statewide, and in the NAAs?

Under the regulations, outside the five NAAs, farmers can use any application method allowed by the product labeling, except for methyl bromide fumigations. DPR has already restricted methyl bromide applications to reduce air toxins, and only methods allowed in those regulations can be used.

In the Sacramento and South Coast NAAs — where pesticide VOCs have already been reduced below emission targets — the new regulations specify that only certain "standardized" fumigant application methods be used between May 1 and October 31. These are methods for which DPR has emission data, and include nearly all those that are commonly used.

In the three NAAs where further VOC reductions are needed (San Joaquin, Southeast Desert, and Ventura), fewer

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From May 1 to October 31, all fumigations in the nonattainment areas must be done using certain application methods.

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application methods will be allowed. The regulations require only low-emission methods be used in these NAAs between May and October.

Go to www.cdpr.ca.gov, click on the "A-Z Index" and then "VOC regulations" to download fact sheets describing the standardized fumigation methods that can be used in the five NAAs, and information on which methods are low-emission and can be used in the Ventura, San Joaquin Valley, and Southeast Desert NAAs.

What happens if new application methods are developed that have lower emissions?

Pesticide makers are encouraged to develop new, lower-emission methods. They can submit emission data on these methods to DPR. The rules set up an expedited approval process if new application methods are developed that lower emissions.

If emissions are no greater than current standardized methods for that fumigant, the new methods will be approved for use in the Sacramento and South Coast NAAs. If they are no greater than the low-emission methods for the fumigant, they will be approved for use in all five NAAs.

Emission Limits

*How **do** the emission limits work?*

The regulations set VOC emission targets for all five nonattainment areas. The targets are based on each NAA's emissions in 1991, and are set 20 percent below that level. The emission target will be in effect each year between May 1 and October 31, the "ozone season" in California when the air standard is most often exceeded.

Each year, DPR will evaluate the most recent data on emissions in the NAAs from fumigant and non-fumigant pesticides. If needed, DPR will then draft an aggregate fumigant emission limit to make sure the overall agricultural and structural pesticide VOC target is not exceeded in an NAA.

This analysis and any proposed fumigant emission limits will be in a draft emission inventory report DPR will release each fall. The report will ensure that the pesticide VOC reduction strategy accounts for annual emissions of both fumigant and non-fumigant pesticides.

After a 45-day public comment period, DPR will issue a final report and set fumigant emission limits for each NAA, as required. After the final report is issued, farmers in the Ventura, San Joaquin Valley and Southeast Desert NAAs who want to use fumigants in the coming year will file requests for an emission allowance. *(DPR projects that low-emission methods to be required in the San Joaquin Valley and Southeast Desert NAAs will be sufficient to reduce VOCs so that restrictions on individual fumigations will not be needed. Therefore, in 2008, emission allowances will apply only in the Ventura NAA.)*

All farm fumigants are restricted materials. Anyone intending to use a restricted material must get a site- and time-specific permit from the County Agricultural Commissioner.

The emission allowance requests will include the name of the product, the application rate, acres, and fumiga-

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In NAAs where it is necessary to do so, DPR will assign each grower an emission allowance for applications planned from May through October. The allowance will become part of the restricted material permit required to use fumigants.

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tion method. Commissioners will forward the requests to DPR, where they will be compiled. If the total amount of fumigant use requested by all growers is above an NAA's fumigant emission limit, DPR will impose proportionate reductions and give each grower an emissions allowance.

The Commissioner will issue fumigant permits conditioned on applicators staying under their emission allowance. Applicators can choose to meet the emission allowance by changing to a lower-emission application method or product, using a lower application rate, or by treating less acreage.

*How **are** the emission limits be enforced?*

The fumigant rules build on a complex system of controls already in place. No other state has California's system for local enforcement of pesticide laws, or requires permits to use restricted pesticides. More than 400 biologists, working for County Agricultural Commissioners in the state's 58 counties, enforce pesticide laws locally.

In NAAs where low-emission methods are not sufficient to reduce pesticide VOCs below the target level, DPR will assign each grower an emission allowance and ensure the allowances total less than the fumigant emission limit for the NAA. The Agricultural Commissioners will include the emission allowance as a condition of the restricted material permit required to use fumigants.

Before using any restricted material, farmers must send a "notice of intent" to use the pesticide, giving the time and date of the application. For fumigants, this will give the County Agricultural Commissioner's staff another opportunity to review the proposed application to assure the application method and amount of fumigant to be applied is consistent with the emission allowance specified in the grower's permit.

It would be a violation of permit conditions if a grower's fumigant applications exceeded the emission allowance. Violating permit conditions can result in suspension or revocation of the restricted materials permit and referral to local or state agencies for further enforcement action.

Is there a different approach used in Ventura County?

DPR estimates that to comply with the emission limits, Ventura County farmers must reduce treated acreage significantly. DPR had proposed to phase in emission reductions in Ventura County over five years. However, in December 2007, the federal court ruled that a phased approach would not comply with its previous order. Therefore, the emission limits must be met immediately in Ventura County, as they will be in the other NAAs.

How does reduction of VOC emissions relate to pesticide drift or air toxins?

In reducing emissions and use, these regulations also help reduce toxic exposure to fumigants. However, this was not the primary goal. Measures to specifically control exposure, such as buffer zones and respirator requirements, either have been implemented (methyl bromide, 1,3-dichloropropene) or are under

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development (metam sodium/MITC, chloropicrin).

You can check the status of mitigation measures by going to DPR's Website, www.cdpr.ca.gov, click on "A-Z Index," and then "Fumigant Resource Center."

Licensing Requirements

What are the new licensing requirements?

The rules specify that when licensed pest control businesses do field fumigations, the work must be supervised by a qualified applicator who has a special field fumigation license. The person acting in a supervisory capacity for a pest control business that conducts field fumigations must also obtain the special field fumigation license.

This licensing requirement, the only element of the new regulations that applies statewide, does not take effect until January 1, 2009.

Private applicators who do field fumigations will not be required to hold the special fumigation license.

How can commercial applicators get the new fumigation license?

DPR will develop training and testing materials for the new license subcategory. It will be available in late 2008.

Persons who already have a qualified applicator license or certificate in pest control category D, G or J, and who have at least two years recent experience conducting field fumigation, will be able to qualify for the new license subcategory without exams or fees.

More information on the fumigation license procedures will be available by fall of 2008 on DPR's licensing Web pages, www.cdpr.ca.gov, click on "Licensing."

Use Reporting Requirements

What are the new use reporting requirements?

Pesticide use reports are a key element in managing VOC emissions. DPR will use pesticide use reports along with its data on how much VOC is emitted from each application method to determine total fumigant emissions for each NAA.

California's comprehensive pesticide use reporting system already records the pesticide product, amount of pesticide used, acres treated, date, location and other information about all agricultural and commercial structural applications. The regulations require applicators in the five NAAs to report the specific method used in each field fumigation. This reporting requirement will be in effect year round.

DPR plans to revise computer programming used by the County Agricultural Commissioners to include this information in standard use reports beginning January 1, 2009. In 2008, an interim reporting system will be in place; applicators will be required to send DPR a copy of the pesticide use report with the application method code added. (The applicator will still send the original pesticide use report to the County Agricultural Commissioner.)

The rules require that, beginning in 2009, pest control businesses that do field fumigations must have a supervisor with special training. This is the only statewide requirement in the new regulations.

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Beginning in 2009, County Agricultural Commissioners will send the application method information to DPR with the standard use report.

For more information on the reporting requirements, including a table listing the application method codes, go to DPR's Web site, www.cdpr.ca.gov, click on "A-Z Index," and then "VOC regulations."

When the Rules Take Effect

When do the new rules go into effect?

The regulations are due to go into effect January 25, 2008, although some elements will be phased in:

- *Fumigation allowance.* In 2008, DPR will develop fumigation allowances *for Ventura County only.* This is not expected to affect the ability of the San Joaquin and Southeast Desert NAAs to achieve their pesticide VOC reduction goals. The requirement to use only low-emission methods in those two NAAs is expected to lower emissions enough to meet the emission target.
- *Field fumigation licensing subcategory.* The requirement that commercial pest control companies have a supervisor with the new license then goes into effect January 1, 2009. In 2008, DPR will develop training and examination materials for the new license subcategory.
- *Pesticide use reporting.* In 2008, fumigators will be required to report to DPR information on their field fumigant method, in addition to the pesticide use report they are already required to file with the County Agricultural Commissioner. In 2009, this information will be included in the standard report, and separate reporting will not be required.

For More Information

How can I find out more about the new rules?

You can view or download fact sheets, the regulation text, and other information from DPR's Web site, www.cdpr.ca.gov, click on the "A-Z Index," then "VOC regulations."

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About the Department of Pesticide Regulation

The California Department of Pesticide Regulation (DPR) protects human health and the environment by regulating pesticide sales and use and by fostering reduced-risk pest management. DPR's strict oversight includes product evaluation and registration, environmental monitoring, residue testing of fresh produce, and local use enforcement through the County Agricultural Commissioners. DPR is one of six boards and departments within the California Environmental Protection Agency.